

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improved Closure for Bottles and other Containers

I, SYDNEY CHARLES HART-STILL, a British Subject, of 77/79, St. Marks Road, Bush Hill Park, Enfield, Middlesex, do hereby declare the invention, for which I pray that a patent may be granted to me and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention comprises a closure for bottles and other containers.

The object of the invention is to provide an effective closure which can be readily unsealed without the use of a special tool or implement.

15 The most common method, at present, of sealing bottles, more especially those containing an aerated liquid, is by the "crown" method, where a metal disc, with a soft liner such as cork, is swaged or crimped over an external rim of the bottle mouth, the removal being effected by a special opener. Where, however, the proper opener is not available to the user, an unsuitable implement is frequently used and injury to the hands of the user may result.

20 The closure according to the invention comprises a hollow plug of resilient material adapted to be inserted with a sliding fit in the mouth of a container to be sealed, the hollow part of the plug being blocked by a deformable diaphragm 35 shaped to provide a bulge or pocket which, in the sealing position, extends outwardly (i.e. in the direction opposite to the direction of insertion of the closure) but which is adapted to be depressed so as to extend inwardly in the unsealing position.

The invention is illustrated in the accompanying drawings in which:—

45 Figure 1 is a sectional view of a closure, according to the invention, in the sealing position;

Figure 2 is a section taken on the line 2—2 of Figure 1;

50 Figure 3 is a sectional view of the closure with the diaphragm depressed to permit removal of the closure.

Referring to the drawings, a bottle or like container 1, which is shown partly broken away, contains a liquid the upper part of which is indicated at 2. In the mouth 3 of the bottle is disposed a hollow plug 4 adapted to be inserted with a sliding fit in the mouth.

The plug 4 comprises a circumferential lip or flange 5 which nests on the rim 6 of the mouth 3. The hollow part of the plug 4 is blocked by a deformable diaphragm 7 which is integral with the internal wall 8 of the plug, being joined to the wall about half way between the top and bottom of the plug. The diaphragm 7 has a cylindrical bulge or pocket 9 the top 10 of which, in its outwardly directed position, is slightly below the top of the lip or flange 5. It will be appreciated that the bulge or pocket 9 may be of any suitable shape, which when depressed is, so to speak, turned inside out.

The whole closure is preferably moulded in one piece from a material which is chemically inert, non-porous and sufficiently flexible to ensure a gas-tight seal. A further desirable feature is the retention of flexibility at low temperatures so that refrigeration of the bottle and its contents may be possible. Most suitably, the closure is made of a plastic selected from the ethenoid group of plastics e.g. polythene.

85 The internal wall 8 of the plug comprises a plurality of spaced-apart longitudinal ribs 11 (best seen in Figure 2). This construction is especially suited to take up variations in the internal contour of the bottle mouth. In operation, the thinner parts 12 of the plug, between the ribs 11, expand to cause the plug to make a tight fit in the mouth of the container, whilst the ribs 11 withstand the longitudinally exerted pressure applied when inserting the closure.

90 In operation, the closure is applied as though it were a solid cork, the bulge 9 of the diaphragm 7 extending upwardly. As the plug enters the mouth of the bottle, air is trapped between the dia-

phragm and the liquid, and further downward movement of the plug increases the internal pressure to an extent inversely proportional to the air space reduction. When the plug has been pushed fully home so that the flange 5 is seated on the rim 6 of the mouth, the pressure within the closure will be such that the closure will remain firmly in position. This is because the pressure on the internal wall of the plug causes sufficient frictional grip of the internal wall of the mouth of the bottle to overcome the effect of upward pressure on the diaphragm. This distribution of pressure is illustrated by the arrows in Figure 1.

The removal of the closure is effected by depressing the upward bulge 9 of the diaphragm 7 by means of any blunt article such for example as the end of a pen or pencil. When depressed, the said bulge projects downwardly into the bottle as shown in Figure 3, and the pressure within the closure is thereby substantially increased due to the reduction of the air space, but the force acting on the wall 8 of the plug and tending to force it against the wall 13 of the mouth of the bottle is largely, if not entirely, compensated (as shown by the arrows in Figure 3) by the force (acting in the opposite direction) against the opposing wall 14 of the bulge. The closure thus has now little or no restraining force acting upon it and will either be ejected automatically or will be easily removable by hand.

What I claim is:—

1. A closure comprising a hollow plug of resilient material adapted to be inserted with a sliding fit in the mouth of a container to be sealed, the hollow part of the plug being blocked by a deformable diaphragm shaped to provide a bulge or pocket which in the sealing position extends outwardly, i.e. in the direction opposite to the direction of insertion of the closure, but which is adapted to be depressed so as to extend inwardly in the unsealing position.

2. A closure as claimed in Claim 1 in which the plug comprises a circumferential lip or flange adapted, when the plug is fully inserted, to nest on the rim of the mouth of the container.

3. A closure as claimed in Claim 1 or 2 in which the internal wall of the plug

comprises a plurality of spaced-apart longitudinal ribs.

4. A closure as claimed in any of the preceding claims in which the pocket or bulge is cylindrical.

5. A closure as claimed in any of the preceding claims in which the diaphragm is integral with the internal wall of the plug.

6. A closure as claimed in any of the preceding claims in which the closure is a molding of polythene.

7. A closure comprising a resilient hollow plug adapted to be inserted with a sliding fit in the mouth of a container to be sealed, the plug having an open lower end communicating with the container, and a deformable diaphragm sealing the interior of said plug, the said diaphragm having a peripheral portion substantially perpendicular to the axis of the plug and an axial bulged portion integral with the said peripheral portion and of a cross-sectional shape and size substantially smaller than the interior of the plug, the said bulged portion normally projecting axially in the plug away from the interior of the container and being deformable upon the application of axial pressure against the end thereof to extend inwardly of the container from the said peripheral portion whereby, when the bulged portion is in its normal position, pressures within the container will act radially outwardly against said bulged portion in the vicinity of said peripheral portion to tend to seat the plug more firmly in the mouth of the container while such pressures will act radially inwardly on the bulged portion when the latter projects inwardly of the container to transmit radially inward forces to said peripheral portion to reduce the frictional engagement of the plug with the mouth of the container.

8. A closure as claimed in Claim 7 wherein the interior of said plug below said diaphragm is provided with a plurality of spaced-apart longitudinal ribs.

9. A closure substantially as described and as shown in the accompanying drawings.

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PROVISIONAL SPECIFICATION

Improved Closure for Bottles and other Containers

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be described in the following statement:—

This invention comprises a closure for bottles and other containers.

The object of the invention is to provide an effective closure which can be readily unsealed without the use of a special tool or implement.

- 5 The most common method, at present, of sealing bottles, more especially those containing an aerated liquid, is by the "crown" method, where a metal disc, with a soft liner such as cork, is swaged
10 or crimped over an external rim of the bottle mouth, the removal being effected by a special opener. Where, however, the proper opener is not available to the user, an unsuitable implement is frequently
15 used and injury to the hands of the user may result.

- The closure according to the invention comprises a hollow plug of resilient material adapted to be inserted with a
20 sliding fit in the mouth of the container to be sealed, the hollow part of the plug being blocked by a deformable diaphragm shaped to provide a pocket or bulge which, in the sealing position, extends
25 outwardly (i.e. in the direction opposite to the direction of insertion of the closure) but which is adapted to be depressed so as to extend inwardly for the purpose of unsealing the closure.

- 30 In a preferred embodiment, the plug comprises a circumferential lip or flange adapted, when the plug is fully inserted, to nest on the rim of the mouth of the container. The diaphragm is
35 integral with the internal wall of the plug, being joined to the wall about half way between the top and bottom of the plug. The diaphragm has a bulge or pocket the top of which, in its outwardly
40 directed position, is flush with, or is below the top of the lip or flange. The bulge or pocket may be cylindrical or of any other suitable shape, which when depressed, is, so to speak, turned inside
45 out.

- The whole closure is preferably moulded in one piece from a plastic material which is chemically inert, non-porous and sufficiently flexible to ensure a
50 gas-tight seal. A further desirable feature is the retention of flexibility at low temperatures so that refrigeration of the bottle and its contents may be possible. Most suitably, the closure is made
55 of a plastic selected from the ethenoid group of plastics e.g. polythene.

The internal wall of the plug may, if desired, comprise a plurality of space-

60 apart longitudinal ribs. This construction is especially suited to take up variations in the internal contour of the bottle mouth. When this form of plug is used, the thinner parts of the plug, between the ribs, expand to cause the plug to make a tight fit in the mouth of the container,
65 whilst the ribs withstand the longitudinally exerted pressure applied when inserting the closure.

In operation, as applied to a bottle with a mouth at the top, the bottle is filled in the normal manner to a distance of say
70 about one inch from the top, with a suitable liquid which may or may not be aerated. The closure is then applied as though it were a solid cork, the bulge of the diaphragm extending upwardly. As the plug enters the mouth of the bottle, air is trapped between the diaphragm and the liquid, and further downward movement
75 of the plug increases the internal pressure to an extent inversely proportional to the air space reduction. When the plug has been pushed fully home so that the flange is seated on the rim of the mouth, the pressure within the closure will be such
80 that the closure will remain firmly in position. This is because the pressure on the internal wall of the plug causes sufficient frictional grip on the internal wall of the mouth of the bottle to overcome the
85 effect of upward pressure on the diaphragm.

The removal of the closure is effected by depressing the upward bulge of the diaphragm by means of any blunt article, such for example as the end of a pen or pencil. When depressed, the said bulge projects downwardly into the bottle and the pressure within the closure is thereby
90 substantially increased due to the reduction of the air space, but the force acting on the wall of the plug and tending to force it against the wall of the mouth of the bottle is largely, if not entirely, compensated by the force (acting in the
95 opposite direction) against the opposing wall of the bulge. The closure thus has now little or no restraining force acting upon it and will either be ejected automatically or will be easily removable by
100 110 hand.

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1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

